REMARKS

Claims 1-46 are pending in the application. Claims 1-46 stand rejected. Applicant extends appreciation to the Examiner for allowing a personal interview on October 22, 1999, to discuss aspects of the invention in view of the outstanding office action. Applicant has amended Claims 2-4, 6-8, 10-12, and 30-46. Applicant now addresses each rejection presented in the office action.

Independent Claims

Upon filing of the application, Applicant considered Claims 2-4, 6-8, 10-12, 30-32, 34-36, 38-44, and 46 to be independent claims. Although these claims referred to other claims, they did not meet the definition of a "dependent" claim under 35 U.S.C. §112 since they did not "specify a *further limitation* of the subject matter claimed." (35 U.S.C. §112, fourth paragraph) Upon filing, Applicant paid the proper fees for independent claims, but the Office refunded these fees, counting the claims as "dependent" because of the reference to other claims. In order to eliminate the confusion, Applicant has amended Claims 2-4, 6-8, 10-12, 30-32, 34-36, 38-44 and 46 to eliminate the reference to other claims and to clarify that these are independent claims. Applicant believes that the fee for independent claims in excess of three is therefore due for 22 claims at the rate of $39.00 per claim, and enclosed herewith is a check for $858.00. In the event the attached check is unacceptable, is insufficient, or lost, please charge the required fee to Deposit Account No. 18-1260. Please credit any overpayment to Deposit Account No. 18-1260.

Claim Objection under 37 C.F.R. §1.75(c)

Claim 38 has been objected to as being in improper form for a multiple dependent claim. Applicant has amended Claim 38 by removing the reference to Claim 29 and incorporating the language of Claim 29 into Claim 38. Applicant believes that amended Claim 38 obviates this objection.

Claim Rejections under 35 U.S.C. §112, first paragraph

Claims 1-46 stand rejected under 35 U.S.C. §112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. In particular, the invention employs sesame lines designated "Sesaco 22," "Sesaco

23," "Sesaco 24," "19A," and "11W," and since these sesame lines are essential to the invention, they must be known and readily available to the public or made or isolated without undue experimentation.

The above-identified sesame lines have not been deposited under the Budapest Treaty at this time. Pursuant to 37 C.F.R. §1.801-1.809, Applicant submits herewith the Declaration of Glenn C. Smith which provides assurance of compliance on or before payment of the issue fee. Upon completion of the deposit under the Budapest Treaty, Applicant will amend the specification to meet the requirements of 37 C.F.R. §1.809. In view of the Declaration of Glenn C. Smith, Applicant respectfully requests that the rejection of Claims 1-46 be withdrawn provided that Applicant meets the requirements of 37 C.F.R. §1.801-1.809 during the pendency of the application.

Claim Rejections under 35 U.S.C. §112, second paragraph

First Rejection

Claims 29-36 stand rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Examiner states that Claims 29 and 33 are vague and indefinite in the recitation of "ATCC accession number ___, ___, ___, ___, and ___" and the cultivar designations "Sesaco 22," "Sesaco 23," "Sesaco 24," "19A," and "11W."

The above-identified sesame lines have not been deposited under the Budapest Treaty at this time. Pursuant to 37 C.F.R. §1.801-1.809, Applicant submits herewith the Declaration of Glenn C. Smith which provides assurance of compliance on or before payment of the issue fee. Upon completion of the deposit under the Budapest Treaty, Applicant will amend the claims to specify the ATCC deposit accession number of the deposited seed of these sesame lines. In view of the Declaration of Glenn C. Smith, Applicant respectfully requests that the rejection of Claims 29-36 be withdrawn provided that Applicant meets the requirements of 37 C.F.R. §1.801-1.808 and makes the appropriate amendments to the claims during the pendency of the application.

Second Rejection

Claims 33-36 stand rejected under 35 U.S.C. §112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. In particular, Claim 33 is considered indefinite in the recitation of "can be classified into the same phenotype group." Furthermore, Claims 34-36 are deemed to fail to clarify the classification method of the claim from which they depend.

Applicant has amended Claims 33-36 to particularly point out that the phenotype of the non-dehiscent sesame is characterized by the physiological and morphological features of a capsule opening of slightly to barely open and moderate to good capsule placenta attachment. Support for this amendment is found on Page 13, line 13 through Page 14, line 5, Page 15, line 13 through Page 16, line 6, Page 19, line 26 to 27, and original Claims 13 and 37.

As previously discussed, Applicant's intention was that Claims 34-36 be considered as independent claims and not dependent claims. Applicant has amended Claims 34-36 accordingly so there can be no doubt that they are independent claims.

Applicant submits that the amendment of Claims 33-36 obviates this rejection and respectfully requests that such rejection be withdrawn.

Third Rejection

Claims 37-44 stand rejected under 35 U.S.C. §112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Specifically, Claim 37 has been deemed vague in the recitation of "moderate to good capsule placenta attachment," and that it is unclear how strong the attachment must be to fall within the claimed phenotype and how this would be determined. Furthermore, Claims 38-44 are deemed to fail to clarify the classification method of the claim from which they depend.

Applicant traverses this rejection. Claims 37-44 recite good to moderate capsule placenta attachment." As described on Page 9, line 8-19 and Fig. 7A-7C, Fig. 7C illustrates good capsule placenta attachment of TP7, wherein the majority of the seeds remains attached in the open capsule. Comparatively, Fig. 7B illustrates moderate capsule placenta attachment of TP4,

wherein about one half of the seeds remains attached in the open capsule. Fig. 7A shows poor capsule placenta attachment of TP1, wherein relatively few seeds remain in the open capsule. On Page 15, line 21, Applicant further specifies that the capsule placenta attachment "needs to be between TP6 to TP8, or moderate to good capsule placenta attachment at the top of the capsule, but the higher the rating, the better." Applicant believes that Fig. 7A-7C and the specification at Page 15, line 14 through Page 16, line 6 provide sufficient guidelines for one skilled in the art to determine the recited characteristic and to determine whether the capsule qualifies as moderate to good placenta attachment.

Claim 37 has been amended to identify the capsule opening and capsule placenta attachment as phenotypic characteristics. As mentioned previously, Applicant's intention was that Claims 38-44 be considered as independent claims and not dependent claims. Applicant has amended Claims 38-44 make it clear that they are independent claims.

Applicant respectfully submits that the amendment and remarks obviates the rejection of Claims 37-44 and requests such rejection be withdrawn.

Fourth Rejection

Claims 41 and 44 stand rejected under 35 U.S.C. §112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Specifically, Examiner states that it is unclear if Claims 41 and 44 read on the F_1 progeny, the F_2 progeny or both generations.

Claim 41 has been amended to clarify the claimed progeny plant is either F_1 or F_2 progeny. Claim 44 has been amended to clearly specify the claimed F_2 progeny.

Applicant respectfully requests that the rejection be withdrawn.

Fifth Rejection

Claims 45-46 stand rejected under 35 U.S.C. §112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Specifically, Claim 45 is deemed vague and indefinite in the term "natural weathering."

Claim 45 has been amended to more clearly define a test useful for determining the mechanical shaker's effective mechanical force used to dislodge the sesame seed. The purpose of the mechanical shaker test is to simulate the effect of exposure to weather on the rate of release of sesame seed from the capsule. In Example 3 on Page 25, line 27 through Page 26, line 3-14, Applicant discloses that for a given mechanical shaker, the effect of exposure to weather on the rate of release of sesame seed can be simulated by adjusting the amount of shaking time necessary to dislodge sesame seed from representative capsules at a rate equivalent to the rate of release caused by exposure to weather. Applicant discloses in Example 2 at Page 25, line 1-26 a quantitative measurement of the rate of release of sesame seed from capsules caused by exposure to weather: dividing the weight of seed manually removed from representative capsules harvested from sesame plants left in the field for three months after initial drydown by the weight of seed manually removed from representative capsules harvested from sesame plants at initial drydown. Applicant believes that amended Claim 45 now quantitatively specifies the effective mechanical force of the shaker.

Applicant respectfully requests that this rejection as it might be applied to amended Claims 45-46 be withdrawn.

Claim Rejections under 35 U.S.C. §102/103 - Day (April, 1998)

Applicant apologizes for the inadvertent omission of portions of this reference. A complete copy of the Day reference was hand-delivered to the Examiner during the personal interview on October 22, 1999.

Claims 2, 4, 6, 8, 10, 12, 34, 36, 40, and 43 stand rejected under 35 U.S.C. §102(a) as being anticipated by or in the alternative obvious over Day. The Examiner states that (1) the phenotype of the progeny of the claimed plants is not specified, (2) that Day teaches sesame lines which have good seed retention and moderately high capsule strength and elasticity, (3) that the progeny of the claimed sesame plants would be the same as or indistinguishable from the plants taught by Day, and (4) the claims have no limitations regarding phenotype of the progeny and therefor the plants taught in the prior art are the same as those claimed.

Claims 2, 4, 6, 8, 10, 12, 34, 36, 40, and 43 have been amended, and Applicant traverses this rejection to the extent that the Examiner would apply the rejection to the amended claims. Claims 2, 4, 6, 8, 10, and 12 have been amended to characterize the progeny as possessing shatter resistance derived from the non-dehiscent sesame plant. Claims 34, 36, 40, and 43 have been amended to describe progeny having phenotypic characteristics of a capsule opening of slightly to barely open and a moderate to good capsule placenta attachment. Applicant teaches a non-dehiscent sesame characterized by increased shatter resistance which reduces loss of sesame seed due to exposure to inclement weather while the sesame stands in the field but readily releases the sesame seed with minimal damage when mechanically harvested. Applicant further teaches essential phenotypic characteristics which contribute to the non-dehiscent sesame's shatter resistance: a slightly to barely open capsule opening and a moderate to good capsule placenta attachment.

Day's approach to improved sesame was to determine the association between seed retention and the anatomical and physiological characteristics of sesame capsules which might lead to an understanding of the process of seed loss and identification of traits which might improve seed retention (Page 3, line 8-10 of the Day reference). In his study, Day examined twelve day old green capsules from a sesame plant grown in a glasshouse under controlled conditions, and on Page 5, line 20-22 of the Day reference, Day cautions about applying the data which was collected on one glasshouse-grown plant to plants grown under field conditions. Thus, Day recognized that his data might not represent what a farmer could expect from crops grown in the field. Day found the following capsule morphological characteristics of interest: seed attachment, suture split length, capsule length, and capsule opening ("capsule split" and "capsule opening" are used interchangeably by Day to represent "capsule split" as defined by Applicant in the present invention). Day reported substantial variation in capsule morphology and seed retention. Of the four morphological characteristics studied, Day teaches that the relationship between capsule opening (equivalent to capsule split in the present application) and seed retention was poor, suggesting that the size of the aperture that occurs when a capsule splits is a poor estimate of the seed retention properties of the capsule (Page 6, line 8-10 of the Day reference). From his experimental plants, Day identified sesame having reduced capsule split

with high capsule strength and elasticity, in particular, certain known varieties of sesame which were superior in seed retention, seed attachment, and reduced capsule split length to other known varieties (Fig. 2, Table 4 of the Day reference). Day also teaches three ways that seed retention might be enhanced by capsule anatomical characteristics: 1) increase mesocarp cell layers over the suture region from the suture vascular bundle to the epidermis to prevent capsule split; 2) decrease the difference between the mesocarp and endocarp tissue layers, leading to less force pulling capsule apart; and 3) increased seed attachment (Page 7, line 12-22). According to Day, sesame varieties should be selected to provide appropriate mesocarp and endocarp layers necessary to reduce capsule split.

The teachings of Day do not disclose Applicant's invention. First, Day examined capsule morphology and seed retention in green capsules, while Applicant's invention relates to the characteristics of capsules at the time of harvest. As indicated above, while Day promotes reduce capsule split, Applicant's non-dehiscent sesame preferably has maximum capsule split from the tip of the capsule to its base. Day further teaches sesame having reduced capsule split with high capsule strength and elasticity, all of which would make mechanized harvesting more difficult and lead to loss of seed quality. In contrast, as discussed in the specification of the present invention on Page 13, line 7-12, Applicant's non-dehiscent sesame preferably has increased capsule split which makes threshing the capsule in the combine easier. Further, in no way did Day teach the importance of the capsule characteristic of capsule opening as taught by Applicant. With regard to increased seed attachment, Day provides no guidance as to how to achieve this characteristic, while Applicant discloses that increased placenta attachment, particularly in seeds at the top of the capsule provides increased seed attachment. Day teaches sesame which lacks the physiological and morphological characteristics necessary to provide both increased shatter resistance and improved mechanical harvesting. Day does not teach non-dehiscent sesame characterized by increased shatter resistance as disclosed in the present invention. Day does not teach or suggest non-dehiscent sesame having shatter resistance as a means to improve seed retention, nor do high capsule strength and elasticity and moderately low endocarp and capsule width contribute to better shatter resistance. Day does not teach or suggest a non-dehiscent sesame line which combines the phenotypic characteristics of the present invention to increase

shatter resistance while improving mechanical harvesting yield. Day does not teach or suggest phenotypic characteristics which would lead to increased shatter resistance. Thus, the progeny of the claimed sesame plants differ from the plants taught by Day. Moreover, it would not be obvious for one skilled in the art to develop a non-dehiscent sesame having the phenotypic characteristics of the present invention based on the teachings of high capsule strength and elasticity as taught by Day.

Applicant respectfully requests that this rejection as it might be applied to amended Claims 2, 4, 6, 8, 10, 12, 34, 36, 40, and 43 as being anticipated by Day or in the alternative obvious over Day be withdrawn.

Claim Rejections under 35 U.S.C. §102/103 - Bakheit et al

Claims 2, 4, 6, 8, 10, 12, 34, 36, 40, and 43 stand rejected under 35 U.S.C. §102(a) as being anticipated by or in the alternative obvious (35 U.S.C. §103) over Bakheit et al (hereinafter referred to as "Bakheit"). The Examiner states that (1) the phenotype of the progeny of the claimed plants is not specified, (2) that Bakheit teaches F_1 and F_2 plants obtained crosses through crosses between dehiscent and indehiscent culivars, (3) the progeny of the claimed sesame plants would be the same or indistinguishable from the plants taught by Bakheit et al, and (4) the claims have no limitations regarding phenotype of the progeny and therefor the plants taught in the prior art are the same as those claimed.

Claims 2, 4, 6, 8, 10, 12, 34, 36, 40, and 43 have been amended, and Applicant traverses this rejection to the extent that the Examiner would apply the rejection to the amended claims. Claims 2, 4, 6, 8, 10, and 12 have been amended to characterize the progeny as possessing shatter resistance derived from the non-dehiscent sesame plant. Claims 34, 36, 40, and 43 have been amended to describe progeny having phenotypic characteristics of a capsule opening of slightly to barely open and a moderate to good capsule placenta attachment. Applicant teaches a non-dehiscent sesame characterized by increased shatter resistance which reduces loss of sesame seed due to exposure to inclement weather while the sesame stands in the field and during harvesting but readily releases the sesame seed when mechanically harvested. Applicant further teaches phenotypic characteristics which contribute to the non-dehiscent sesame's shatter resistance to

withstand inclement weather and mechanical harvesting and the ability to release seed at harvest: a slightly to barely open capsule opening, a moderate to good capsule placenta attachment, moderate capsule constriction, complete capsule membrane, a capsule split extending from the top of the capsule to approximately the base of the capsule, and a capsule membrane attachment with moderate to little observable separation between the membrane and placenta.

Bakheit studied the inheritance of certain qualitative characters (i.e., capsule dehiscence, branching habit, and the number of capsules per leaf axil) and quantitative characters (i.e., the number of days to first flowering, days to maturity, the height of the first capsule, plant height, and seed yield/plant) during the crossing and backcrossing of various dehiscent sesame lines as well as the crossing of a commercial dehiscent sesame variety with an indehiscent line. On Page 31, first full paragraph, Bakheit teaches the inheritance of capsule dehiscence as follows: (1) in crossing an indehiscent variety with a dehiscent variety, capsules from the F_1 plants were dehiscent and capsules from F_2 plants were a 3:1 ratio of dehiscent to indehiscent; (2) backcrossing the F_1 hybrid to the dehiscent parent resulted in plants with dehiscent capsules; and (3) backcrossing the F_1 hybrid to the indehiscent parent resulted in a 1:1 ratio of plants with dehiscent capsules and indehiscent capsules. Bakheit describes the results of all of his crosses as either dehiscent or indehiscent. Bakheit does not teach or suggest non-dehiscent sesame characterized by increased shatter resistance which reduces loss of sesame seed due to exposure to inclement weather while the sesame stands in the field and during harvesting but readily releases the sesame seed when mechanically harvested. Bakheit does not teach or suggest a non-dehiscent sesame line which combines the phenotypic characteristics of a slightly to barely open capsule opening and a moderate to good capsule placenta attachment. Thus, the progeny of the claimed sesame plants differ from the plants taught by Bakheit. Moreover, it would not be obvious for one skilled in the art to develop a non-dehiscent sesame having the phenotypic characteristics of the present invention based on the teachings of Bakheit.

Applicant respectfully requests that this rejection as it might be applied to amended Claims 2, 4, 6, 8, 10, 12, 34, 36, 40, and 43 as being anticipated by Bakheit or in the alternative obvious over Bakheit be withdrawn.

Claim Rejections under 35 U.S.C. §103 - Bakheit et al

Claims 37-44 stand rejected under 35 U.S.C. §103 as being unpatentable over Bakheit et al (hereinafter referred to as "Bakheit"). The Examiner states that (1) the present claims are drawn to methods of breeding non-dehiscent sesame and the plants generated therefrom, (2) Bakheit teaches crosses between dehiscent and indehiscent culivars to obtain F_1 hybrids and the subsequent production of backcross or F_2 plants, (3) Bakheit's study of the inheritance of capsule dehiscence indicates indehiscence is a recessive trait, (4) the cross between the dehiscent and indehiscent cultivars yielded more seed than the parent lines and produced a high genetic advance, (5) Bakheit does not teach selecting for capsule placenta attachment, (6) it would have been prima facie obvious to one skilled in the art to cross indehiscent and dehiscent lines of sesame to produce F_1 and F_2 plants because Bakheit teaches to do so and that the offspring had heterosis, and (7) a skilled plant breeder would be motivated to include strong capsule placental attachment as a selection criteria in the interest of preventing seed loss.

Claims 37-44 have been amended to specifically recite a method of breeding selected sesame plants with specific capsule characters (capsule opening of barely to slightly open and moderate to good capsule placenta attachment) which resulted in shatter resistant F_2 plants having these capsule characteristics and plants and seeds derived therefrom, and Applicant traverses this rejection to the extent that the Examiner would apply the rejection to the amended claims. Claims 37-44 have been amended to characterize the progeny as having phenotypic characteristics of a capsule opening of slightly to barely open and a moderate to good capsule placenta attachment. Applicant discloses a non-dehiscent sesame characterized by increased shatter resistance which reduces loss of sesame seed due to exposure to inclement weather while the sesame stands in the field but readily releases the sesame seed when mechanically harvested. Applicant's amended claims recite essential phenotypic characteristics which contribute to the non-dehiscent sesame's shatter resistance: a slightly to barely open capsule opening and a moderate to good capsule placenta attachment.

The method of breeding presented by Bakheit involved crossing and backcrossing varieties of dehiscent sesame as well as a commercial variety of dehiscent sesame with an indehiscent variety. Bakheit's method differs from the method of the present invention in many

aspects. Bakheit teaches crossing and backcrossing dehiscent and indehiscent varieties as a means to improved sesame lines. On Page 31, first paragraph, Bakheit shows that crossing dehiscent with indehiscent types yielded homozygous dehiscent, heterozygous indehiscent, and homozygous indehiscent sesame. The homozygous dehiscent and heterozygous indehiscent lines yielded dehiscent (shattering; seeds readily lost from capsule) capsules, while the homozygous indehiscent line yielded indehiscent (closed; all seeds remain in closed capsule) capsules. In contrast, the method of the present invention involves the selection and breeding of sesame lines which exhibit specific shatter resistant characters or capsule morphology such as a capsule opening which is slightly to barely open and a capsule placenta attachment rated as moderate to good to produce non-dehiscent sesame (shatter resistant sesame in which seeds remain inside the capsules in the field but readily release from the capsule during harvesting).

Bakheit reported significant heterosis and genetic advance in seed yield/plant. Heterosis is defined in *Dorland's Illustrated Medical Dictionary* (copy attached at Tab A) as "the condition in which the first generation hybrid [F_1] shows more vigor as measured by growth, survival, and fertility, than either of the parent strains." Heterosis results in increased seed yield in the F_1 generation, but it does not result in increased shatter resistance. In crossing a shattering line with a shatter resistance line, the F_1 progeny is shattering. Thus, even though the potential yield is increased, if there is no shatter resistance mechanisms in place, the amount of seed lost due to weathering or harvesting will reduce actual yields substantially. In crossing two lines with shatter resistance, the F_1 will have shatter resistance, but increases in shatter resistance have not been at the F_1 level of selection but rather in selection in succeeding progeny. Thus, heterosis does not increase the level of shatter resistance. Applicant's method of breeding does not involve heterosis but rather is directed at improving shatter resistance through a selective combination of specific shatter resistant characters, resulting in a non-dehiscent sesame in which seed loss due to weathering or harvesting is minimized. Thus, the method of breeding sesame and the plants generated therefrom by the present invention are different from those as taught by Bakheit.

Bakheit does not teach or suggest combining his method of crossing dehiscent and indehiscent lines of sesame with the shatter resistant character of a strong capsule placenta

attachment. However, were a dehiscent line crossed with an indehiscent line as taught by Bakheit to produce a line having strong placenta attachment, the resulting sesame line would still be a dehiscent (shattering; seeds readily lost from capsule) or an indehiscent (closed; all seeds remain in closed capsule) line. Strong placenta attachment alone does not give sufficient shatter resistance to result in a non-dehiscent (shatter resistant sesame in which seeds remain inside the capsules in the field but readily release from the capsule during harvesting) sesame line as taught in the present invention on Page 3, line 30 through Page 4, line 7 and Page 10, line 20-24. Capsule placenta attachment is only one of several phenotypic characteristics combined by the breeding method of the present invention to produce non-dehiscent sesame. Thus, the inclusion of strong placenta attachment as a selection criteria in Bakheit's breeding method does not render the invention of Claims 37-44 obvious.

Applicant respectfully requests that this rejection be withdrawn.

Claim Rejections under 35 U.S.C. §103 - Delgado et al

Claims 37-44 stand rejected under 35 U.S.C. §103 as being unpatentable over Delgado et al (hereinafter referred to as "Delgado"). The Examiner states that (1) the present claims are drawn to methods of breeding non-dehiscent sesame and the plants generated therefrom, (2) Delgado teaches that the low yield of the sesame crop can be attributed to seed loss from capsule dehiscence and that crosses between dehiscent and indehiscent culivars produce hybrids with high heterosis, (3) Delgado does not teach selecting for capsule placenta attachment, (4) it would have been prima facie obvious to one skilled in the art to cross indehiscent and dehiscent lines of sesame to produce plants with hybrid vigor as taught by Delgado, and (5) a skilled plant breeder would recognize that sesame seed is lost during harvest and that stronger placenta attachment would lessen seed loss.

Claims 37-44 have been amended to specifically recite a method of breeding selected sesame plants with specific capsule characters (capsule opening of barely to slightly open and moderate to good capsule placenta attachment) which resulted in shatter resistant F_2 plants having these capsule characteristics and plants and seeds derived therefrom, and Applicant

traverses this rejection to the extent that the Examiner would apply the rejection to the amended claims. Claims 37-44 have been amended to characterize the progeny as having phenotypic characteristics of a capsule opening of slightly to barely open and a moderate to good capsule placenta attachment. Applicant teaches a non-dehiscent sesame characterized by increased shatter resistance which reduces loss of sesame seed due to exposure to inclement weather while the sesame stands in the field but readily releases the sesame seed when mechanically harvested. Applicant further teaches essential phenotypic characteristics which contribute to the non-dehiscent sesame's shatter resistance: a slightly to barely open capsule opening and a moderate to good capsule placenta attachment.

The method of breeding as taught by Delgado in the abstract involved crossing indehiscent sesame lines and crossing indehiscent sesame lines with dehiscent sesame lines to produce varieties with hybrid vigor. Delgado reported significant heterosis. As previously mentioned, heterosis is associated with increased seed yield, but does not increase shatter resistance. Applicant's method of breeding does not involve heterosis but rather is directed at improving shatter resistance through a selective combination of specific shatter resistant characters, resulting in a non-dehiscent sesame in which seed loss due to weathering or mechanical harvesting is minimized. Thus, the method of breeding sesame and the plants generated therefrom by the present invention are different from those as taught by Delgado.

Delgado does not teach or suggest combining his method of crossing indehiscent lines or crossing dehiscent and indehiscent lines of sesame with the shatter resistant character of a strong capsule placenta attachment. However, were a dehiscent line crossed with an indehiscent line as taught by Delgado to produce a line having strong placenta attachment, the resulting sesame line would still be a dehiscent (shattering; seeds readily lost from capsule) or an indehiscent (closed; all seeds remain in closed capsule) line. Strong placenta attachment alone does not give sufficient shatter resistance to result in a non-dehiscent (shatter resistant sesame in which seeds remain inside the capsules in the field but readily release from the capsule during harvesting) sesame line as taught in the present invention on Page 3, line 30 through Page 4, line 7 and Page 10, line 20-24. Capsule placenta attachment is only one of several phenotypic characteristics

which can be combined by the breeding method of the present invention to produce non-dehiscent sesame. Thus, the inclusion of strong placenta attachment as a selection criteria in Delgado's breeding method does not teach the present invention.

Applicant respectfully requests that this rejection as it might be applied to amended Claims 37-44 as being unpatentable over Delgado be withdrawn.

Claim Rejections under 35 U.S.C. §103 - Bakheit et al and Delgado et al in view of Day

Claims 37-44 stand rejected under 35 U.S.C. §103 as being unpatentable over Bakheit et al and Delgado et al in view of Day. The Examiner states that (1) Bakheit teaches crosses between dehiscent and indehiscent cultivars to obtain F_1 hybrids and the subsequent production of F_2 plants, (2) Bakheit teaches the cross between dehiscent and indehiscent cultivars yielded plants with high heterosis, (3) Delgado teaches seed loss from capsule dehiscence and that crosses between dehiscent and indehiscent cultivars yielded hybrids, (4) Bakheit and Delgado do not teach selecting for placenta attachment, (5) Day teaches that the anatomy of the sesame capsule influences seed retention and suggests breeding for particular morphological traits that should lead to reduction in seed loss, and (6) it would have been prima facie obvious to one skilled in the art to cross indehiscent and dehiscent lines of sesame to obtain lines with heterosis as taught by Bakheit and Delgado and to further consider the capsule morphology in the selection steps as taught by Day to obtain plants that minimize seed loss.

Claims 37-44 have been amended to specifically recite a method of breeding selected sesame plants with specific capsule characters (capsule opening of barely to slightly open and moderate to good capsule placenta attachment) which resulted in shatter resistant F_2 plants having these capsule characteristics and plants and seeds derived therefrom, and Applicant traverses this rejection to the extent that the Examiner would apply the rejection to the amended claims. Claims 37-44 have been amended to characterize the progeny as having phenotypic characteristics of a capsule opening of slightly to barely open and a moderate to good capsule placenta attachment. Applicant teaches a non-dehiscent sesame characterized by increased shatter resistance which reduces loss of sesame seed due to exposure to inclement weather while

the sesame stands in the field but readily releases the sesame seed when mechanically harvested. Applicant further teaches phenotypic characteristics which contribute to the non-dehiscent sesame's shatter resistance: a slightly to barely open capsule opening and a moderate to good capsule placenta attachment.

As previously mentioned, heterosis as taught by Bakheit and Delgado is normally associated with increased seed yield, but heterosis does not increase shatter resistance. In crossing a shattering line with a shatter resistance line, the F_1 progeny is shattering. Thus, even though the potential yield is increased, if there is no shatter resistance mechanisms in place, the amount of seed lost due to weathering or harvesting will reduce actual yields substantially. In crossing two lines with shatter resistance, the F_1 will have shatter resistance, but increases in shatter resistance have not been at the F_1 level of selection but rather in selection in succeeding progeny. Thus, heterosis does not increase the level of shatter resistance. Applicant's method of breeding does not involve heterosis but rather is directed at improving shatter resistance through a selective combination of specific shatter resistant characters, resulting in a non-dehiscent sesame in which seed loss due to weathering or harvesting is minimized. Thus, the method of breeding sesame and the plants generated therefrom by the present invention are different from those as taught by Bakheit and Delgado individually or in combination.

Day teaches sesame with good seed retention having reduced capsule split, high capsule strength and elasticity. In sesame, any capsule character, e.g., capsule split, capsule strength and elasticity, which effects the ability of the closed capsule to withstand weathering and harvesting would contribute to seed retention. However, these same capsule characters for improving seed retention as taught by Day would not teach the present invention. The present invention requires increased shatter resistance, and reduced capsule split and high capsule strength and elasticity do not contribute to shatter resistance. Day does not teach or suggest phenotypic characteristics which would lead to improved seed retention in shattering sesame. Day does not teach or suggest a method of breeding non-dehiscent sesame which combines the phenotypic characteristics of the present invention to increase shatter resistance while improving mechanical

harvesting yield. Thus, what Day teaches in terms of breeding for morphological and anatomical traits to improve seed retention would not be applicable to the present invention.

Bakheit and Delgado teach breeding dehiscent and indehiscent sesame for the benefit of improvement through heterosis, while Day teaches breeding sesame for the benefit of improving seed retention through particular expression of capsule characters which do not lead to non-dehiscent sesame. There is nothing in Bakheit or Delgado to motivate one skilled in the art to combine the teachings of Day with Bakheit and Delgado. Even if Day were combined with Bakheit and Delgado, one would be motivated to breed dehiscent and indehiscent sesame to obtain improvement of seed retention via heterosis. This method of breeding differs significantly from the breeding method of the present invention, wherein specific capsule characters are selectively combined to produce a shatter resistant non-dehiscent sesame. The sesame plants obtainable from combining Day with Bakheit and Delgado would also differ from the non-dehiscent sesame of the present invention. Bakheit and Delgado report that crossing dehiscent and indehiscent sesame leads to either dehiscent or indehiscent sesame. When Day's teachings are combined with those of Bakheit and Delgado, one could anticipate possible improvement in the seed retention in the F_1 plants by introduction of capsule characters supportive of improved seed retention in sesame such as strong capsule strength and elasticity. However, as discussed previously, the improved sesame obtained by combining Day with Bakheit and Delgado would differ significantly from the shatter resistant non-dehiscent sesame of the present invention.

Bakheit and Delgado combined with Day does not teach or suggest combining a method of crossing indehiscent lines or crossing dehiscent and indehiscent lines of sesame with the shatter resistant character of a strong capsule placenta attachment. However, were a dehiscent line crossed with an indehiscent line as taught by Bakheit and Delgado to produce a line having strong placenta attachment, the resulting sesame line would still be a dehiscent (shattering; seeds readily lost from capsule) or an indehiscent (closed; all seeds remain in closed capsule) line. Strong placenta attachment alone does not give sufficient shatter resistance to result in a non-dehiscent (shatter resistant sesame in which seeds remain inside the capsules in the field but

readily release from the capsule during harvesting) sesame line as taught in the present invention on Page 3, line 30 through Page 4, line 7 and Page 10, line 20-24 of the present specification. Capsule placenta attachment is only one of several phenotypic characteristics combined by the breeding method of the present invention to produce non-dehiscent sesame. Thus, the inclusion of strong placenta attachment as a selection criteria in a breeding method suggested by Bakheit and Delgado combined with Day does not teach the present invention.

Applicant respectfully requests that this rejection as it might be applied to amended Claims 37-44 as being unpatentable over Bakheit and Delgado in view of Day be withdrawn.

Prior Art

Details regarding the release of the claimed line "Sesaco 22" as mentioned in Langham (1998) are presented for the record in the attached Declaration of Derald Ray Langham. As outlined in the declaration, Applicant believes that this release does not constitute a public use or sale bar according to 35 U.S.C. §102(b).

Respectfully submitted,

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